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TERM STRUCTURE INTERMEDIATION BY DEPOSITORY INSTITUTIONS

by

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1. INTRODUCTION

Deposit transformation, or term structure intermediation, is the process through which financial intermediaries create long-term loans from short-term deposits. Although deposit transformation is a traditional and important topic of discussion for European banking systems, it has not been emphasized in the American banking literature. [1] Recent developments in U.S. capital markets, however, have important implications for the deposit transformation activities of U.S. institutions, most importantly the thrift institutions. In this paper a framework and theoretical model is developed for analyzing transformation activities, which is then applied to the actual situtions of these depository institutions. The theoretical model extends the recent work of Jaffee [1985] to the case in which the institutions act as price-takers in loan and deposit markets. The application to U.S. thrift institutions concerns both the positive aspects of thrift institution management and the normative aspects of government regulation of the institutions.

Depository institutions have available essentially three alternative strategies regarding the maturity characteristics of their portfolio. One strategy, termed tier matching, requires an exact balance of assets and liabilities at each maturity (1r duration) tier. Tier matched portfolios have the advantage that there is no risk with regard to interest rate fluctuations, but

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1. See OECD [1967, p. 104] and Hewson [1975] for discussions of deposit transformation in European and European banking markets.

they have the potential disadvantage that profit levels are reduced if the tier matching constraint narrows the opportunity set. A second strategy, called term structure intermediation, allows the institution to take advantage of arbitrage and speculative opportunities in the term structure of interest rates, even if the resulting portfolio is then mismatched by maturity. With an ascending yield curve, this leads to the traditional deposit transformation structure with institutions borrowing short-term and lending long-term. The third strategy, hedging alternatives, involves the use of specific positions in capital market securities or futures markets to offset the interest rate exposure of term structure intermediation. The key question with hedging strategies is the cost that must be paid in terms of reduced expected profits in order to obtain the desired reduction in risk.

Commercial banks in the U.S. appear in the normal course to operate with tier matched portfolios. [2] Banks do mismatch their portfolio at times, to be sure, but this is judged to be speculative behavior and is carried out only for brief periods and in response to what are considered unusal market opportunities. Even in these cases, moreover, the magnitude of the mismatch is limited; the difference in duration between assets and liabilities is measured in weeks or at most months.

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2. See Flannery and James [1984] and their citations for empirical evidence confirming that commercial bank portfolios are typically well balanced. Veit and Reiff [1983] provides survey evidence of the use of futures markets by commerical banks to hedge their interest rate exposure.

Thrift institutions in the U.S., in contrast, have operated through most of the period since World War II with dramatically mismatched portfolios, and the difference in duration between assets and liabilities is measured in years if not decades. Most thrift institutions, to be clear, have responded to the evident and extreme volatility in U.S. interest rate levels so far during the 1980s by attempting to carry out new lending in a tier matched fashion and/or to hedge the interest rate exposure. But the resulting profit levels have generally been very low, and new lending strategies address the issue of the already existing portfolio imbalance only by diluting its share of the total portfolio.

This major difference between commercial banks and thrift institutions is important because it provides an additional basis on which to evaluate some of the commonly offered explanations for why the thrift institutions operated as they did. One common explanation, for example, is that Federal insurance of deposits and a limited degree of risk aversion are the key conditions leading to the use of term structure intermediation by thrift institutions. Commercial banks, however, also have Federal deposit insurance, and it is unclear why bank management would be more risk averse than thrift institution management.[3] So Federal deposit insurance and the absence of risk aversion are not sufficient explanations for such thrift institution behavior.

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3. Most commercial banks in the U.S. are shareholder-owned, whereas until recently most thrift institutions were mutual organizations. It would appear that this would create, if anything, more risk averse behavior on the part of mututal organizations.

Another possible explanation for the thrift institution behavior is that thrift management systematically maintains expectations that interest rate levels will decline. Here too, however, the argument is weak both because such expectations would have been wrong more often than not and because it is unclear why bank and thrift managements would systematically maintain different interest rate expectations.

The results of this paper point in a different direction concerning the historical reasons why the thrifts behaved as they did and the current issues of how to deal with the existing thrift institutions and their problems. The analysis here emphasizes the critical role of profit margins and profit opportunities in understanding the distinctive aspects of thrift institution behavior. Profit opportunities depend on the deposit and loan markets in which institutions operate, and there are important differences between commercial banks and thrift institutions in this regard. It is also noteworthy that the capital market conditions faced by all depository institutions and the portfolio choices available to thrift institutions have changed dramatically in recent years. The role of profit margins, changing capital market conditions, and a new regulatory environment are developed in the analysis that follows.

The agenda for the paper is as follows. In the following Section 2 the theory and model of term structure intermediation is developed, which provides the framework for the analysis. In Section 3 the argument is made for understanding the different behavior of commercial banks and thrift institutions as a function of the profit opportunities available in their

respective markets. In Section 4 the analysis is applied to the question of how the thrift institutions should now operate and of the appropriate regulatory positions.

2. A THEORY OF TERM STRUCTURE INTERMEDIATION

Discussions of term structure intermediation, or deposit transformation, are surprisingly rare in the American banking and financial intermediation literature. This literature has been thoroughly reviewed in recent surveys by Baltensperger [1980] and Santomero [1984]. Only the papers by Niehans and Hewson [1976] and Deshmukh, Greenbaum, and Kanatas [1983] even deal with alternative maturities and multi-period planning horizons, and their focus is quite different from the present one. Overall, Santomero's summary that interest risk managment is an area that still, "requires serious modeling and empirical investigation to bring the academic literature up to the institutional realities," is very apt. [4]

The portfolio duration literature also proves to be of only limited value for the issues at hand. The duration literature is directed primarily at analyzing the portfolio maturity structure that minimizes exposure to unexpected interest rate fluctuations, and it generally does not analyze the gains in expected profits

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4. Santomero [1984], p. 597. Recent studies of the the provision of loan commitments and the pricing of floating rate loans by intermediaries represent another literature that deals with maturity questions. The commitment papers use option theory to value the commitments (Thakor, Greenbaum, and Hong [1981]), while the trade-off between interest rate risk and credit risk is the focus of the floating rate papers (Santomero [1983]).

that are generated with exposed positions (Grove [1974] is an exception). This focus of duration theory is understandable because that literature proceeds on the premise of efficient markets and exposure to interest rate risk is idiosyncratic in that setting. The premise of efficient markets is not appropriate, however, in studying the behavior of financial intermediaries because these institutions exist exactly because there are market imperfections. [5]

The model developed here proceeds directly from the traditional banking firm literature, as in Klein [1971], but brings maturity choice and a multi-period planning horizon into the analysis explictly. In a recent paper, Jaffee [1985], this theory is developed with the assumption that the intermediary has monopoly power in both its loan and deposit markets. In this paper, in contrast, it is assumed that the intermediary acts as a competitive price-taker in these markets as well as in the government securities and related capital markets. While it has been an open question whether competition or market power is the better assumption for describing depository intermediary behavior, a variety of recent innovations in U.S. capital markets (discussed below) push strongly in the competitive direction, and competition appears the appropriate assumption for present purposes.

Consider an institution that issues deposits (D), makes loans (A), and takes positions as either assets or liabilities in

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5. This distinction between the traditional banking literature and the finance literature is also made by Taggart [1984].

(government) securities (S). Each instrument is available in two maturities, short-term (subscript 1) and long-term (subscript 2). A balance sheet for such an institution is shown in Table 1, where for purposes of illustration the short-term security position is an asset and the long-term security position is a liability.

Table 1

Balance Sheet At Initial Date (t=0)

ASSETS	LIABILITIES
A_1 Short-term Loans	D_1 Short-term Deposits
S_1 Short-term Securities	S_2 Long-term Securities
A_2 Long-term Loans	D_2 Long-term Deposits

The institution's profits are the interest receipts earned on the assets, less the interest expenses paid on the liabilities, and less its operating costs C. The periodic interest yield on each instrument is denoted as the corresponding lower case symbol; thus d_1 is the periodic interest rate paid on short-term deposits. These yields are treated as riskfree or risk adjusted.[6] Asset positions are treated as algebraically positive, while liabilities are negative; thus $A > 0$, $D < 0$, and $S \gtrless 0$.

A period analysis is used in which one period (year) is the maturity of the short-term instruments and two periods is the

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6. The capital market securities and deposits can be reasonably taken as risk free. Many loan contracts, however, remain risky even after collateral is included, but this risk can be reduced to an actuarial basis and the loan interest rate adjusted for the risk if the institution maintains a diversified portfolio of such loans.

maturity of the long-term instruments. The institution makes its initial decisions at t=0 at the beginning of period 1, the short-term instruments mature at t=1 at the end of period 1, and new decisions can be made at that time for period 2, and so forth. The planning horizon for decisions made at the beginning of period 1 is equal to the two-period maturity of the long-term instruments. The analysis is carried out with a two-period model because it allows the main points to be developed with a minimum of notation.

Profits (P) over the two period horizon can be written as:

$$(1) \qquad P = \sum_{i=1}^{2} [ia_iA_i + is_iS_i + id_iD_i] + c(D_1+D_2) + g(A_1+S_1+D_1) \ .$$

The summation of the first three terms accounts for the interest income and expense on the three instruments for both maturities; recall that liabilities are algebraically negative. [7] This specification uses simple interest, and thus does not compound the earnings from period 1, but the returns on the long-term instruments are multiplied by 2 to account for their double-length holding period. The operating costs (C) are specified as proportional to total deposits at t=0; that is, $C = c(D_1+D_2)$.

The last term in equation (1) concerns the necessary rollover at t=1 of the short-term instruments that mature at that time. The sum $(A_1+S_1+D_1)$ is the net short-term position, g is the average (effective) yield on this position when it is rolled-over for period 2. The return g is unknown at the initial date t=0.

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7. Other sources of income, net worth, and initial portfolio positions are all assumed to be zero.

The role of the rollover term in the profit function can be further understood by considering the balance sheet constraint of the institution. The balance sheet constraint at the initial decision date t=0 is:

$$(2) \qquad A_1 + S_1 + D_1 + A_2 + S_2 + D_2 = 0 \ .$$

This is the algebraic sum of all available instruments and corresponds to the balance sheet shown in Table 1. At the end of period 1, however, the short-term instruments mature and the balance sheet will appear:

Table 2

T-Account Balance Sheet after Period 1 (t=1)

ASSETS	LIABILITIES
A_2 Long-term Loans	D_2 Long-term Deposits
G ($=A_1+S_1+D_1$) Gap	S_2 Long-term Securities

The three long-term positions of course remain on the balance sheet until they mature at t=2. The gap variable G represents the necessary rollover at t=1 of the net value of the maturing one period positions. The revenue or cost associated with maintaining this position during period 2 is accounted for by the last term in the profit equation (1).

The rollover component of the profit function introduces a stochastic element because its interest yield (g) is unknown at t=0. This is analyzed with a mean/variance framework in which the institution is assumed to be risk averse and to maximize expected utility. Expected utility U is a function of expected profits E[P] and the variance of profits V[P]:

(3) $U = U(E[P], V[P]),\ U_1 > 0,\ U_2 < 0.$

The only element of uncertainty in the profit function (1) is the interest rate g at which maturing one period instruments can be rolled over for an additional period at t=1. Denote the expected value of g (taken at t=0) as g_e and the corresponding variance as g_s. Then from (1), we have:

(4a) $$E[P] = \sum_{i=1}^{2}[ia_iA_i + is_iS_i + id_iD_i] + c(D_1+D_2) + g_e(A_1+S_1+D_1).$$

(4b) $$V[P] = g_s(A_1+S_1+D_1)^2 .$$

The maximization of expected utility (3) can be set up as a Lagrangean maximization problem, taking into account the balance sheet constraint (2):

(5) $$\text{Maximize } L = U(E[P], V[P]) - \lambda(A_1+S_1+D_1+A_2+S_2+D_2) ,$$

with E[P] and V[P] defined in (4). The additional constraints that assets be positive and that liabilities be negative are not formally enforced in (5), but are included in the discussion below.

2.A Solutions without Capital Market Securities

The analysis of the maximization problem (5) is simplified by first considering the case in which the securities positions S_1 and S_2 are set equal to zero. The maximization of (5) is thus carried out with respect to the four balance sheet positions A_i, D_i, i = 1,2. The first order necessary conditions for an interior maximum are:

(6a) $\partial L/\partial A_1 = (a_1+g_e)U_1 + 2g_s(A_1+D_1)U_2 - \lambda = 0$;

(6b) $\partial L/\partial D_1 = (d_1+g_e+c)U_1 + 2g_s(A_1+D_1)U_2 - \lambda = 0$;

(6c) $\partial L/\partial A_2 = (2a_2)U_1 - \lambda = 0$;

(6d) $\partial L/\partial D_2 = (2d_2+c)U_1 - \lambda = 0$;

Conditions (6a) and (6b) for A_1 and D_1 show the tradeoff between the marginal contribution of these positions to expected income in the first term and to the variance of income in the second term. The marginal income term includes the one-period yield (a_1 or d_1), the rollover yield for period 2 (g_e), and for (6b) the marginal cost of deposits (c). Conditions (6c) and (6d) for A_2 and D_2 have the same interpretation, but there is no marginal contribution to the variance of income since the yields on these positions are certain for the two period planning horizon.

The interpretation of these conditions is facilitated by noting that all portfolios for the institution must be built from one or more of the positions shown in Table 3:

Table 3

Position #	Asset	Liability	Description
1	A_1	D_1	Tier Matched
2	A_2	D_2	Tier Matched
3	A_2	D_1	Long Transformation
4	A_1	D_2	Short Transformation

The institution's choice among these alternatives depends on the relative values of the interest rates on the four instruments.

The conditions for each one of the positions of Table 3 to be part of the optimal solution are now developed as a function of the relative interest rate levels.

Tier Matched Solutions.

Define M_i, the marginal profit from tier-matched activity at tier i, as:

(7) $\quad M_i = ia_i - id_i - c \ , \ i = 1,2.$

The first order conditions (6) require that $M_i = 0$ for an interior maximum. [8] In this case the institution earns zero profits since the loan interest income just equals the sum of the deposit interest and operating expenses. It is assumed the institution does not use tier-matched positions in this case. This is also a razor-edge case since it requires the exact constellation of interest rates that satisfy $M_i = 0$.

More generally M_i will not equal zero, and tier matched portfolios will occur as corner solutions. If M_i is positive at either maturity tier, then the institution maximizes profits by carrying out the intermediation without limit. If M_i is negative, then the institution wishes to expand by investing in deposits and issuing loans, but is constrained by the condition that assets be positive and liabilities be negative. Tier-matched positions are thus zero whenever $M_i \leq 0$.

The upshot is that tier-matched portfolios are the optimal solution for the institution whenever $M_i > 0$, and the institution will carry out the tier-matched intermediation without limit. It

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8. The substitution of (6b) into (6a) yields $M_1=0$, and the substitution of (6d) into (6c) yields $M_2=0$.

is evident, of course, that institutions operating in this fashion will come to dominate their deposit and loan markets, and ultimately they will face an increasing marginal cost of deposits and a declining marginal revenue from loans. This is the case developed in Jaffee [1985]. It is also noteworthy that tier matched solutions have no risk, and thus dominate the transformation positions (3) and (4) in Table 3 even when the transformation positions provide positive expected utility.

Transformation Solutions.

Transformation solutions become relevant as optimal solutions for the institution when $M_i \leq 0$, that is when tier matched solution are not optimal. By the substitution of (6b) into (6c), the first order condition for transformation position (3) with D_1 and A_2 can be written:

$$(8a) \qquad (2a_2-d_1-g_e-c)U_1 - 2g_s(A_1+D_1)U_2 = 0,$$

and by the substitution of (6d) into (6a), the first order condition for transformation position (4) with D_2 and A_1 can be written:

$$(8b) \qquad (a_1+g_e-2d_2-c)U_1 + 2g_s(A_1+D_1)U_2 = 0.$$

These conditions represent the tradeoff between the marginal contribution to expected profits and the variance of profits from the portfolio positions. For example, in (8a) the marginal contribution to expected income is represented in the first term by the two period return from the loan position A_2 less the period 1 cost, the rollover cost, and the operating costs of the

deposit position; and the marginal contribution to profit variance is represented in the second term by the magnitude of D_1.

From this point it is useful to focus the discussion on the case of long transformation alone (position 3 in Table 3) since this is the case of empirical relevance for the thrift institutions. Parallel results can be derived, however, for the case of short transformation. It is evident from (8a) that a necessary condition for long transformation (hereafter transformation) to be an optimal solution is that the marginal expected profit T from the activity be positive:

$$(9) \qquad T = 2a_2 - d_1 - g_e - c > 0 .$$

In addition, however, it has been already noted that transformation activities will be optimal only if the corresponding tier-matched positions are <u>not</u> optimal; that is:

$$(10a) \qquad M_1 = a_1 - d_1 - c < 0,$$

$$(10b) \qquad M_2 = 2a_2 - 2d_2 - c < 0.$$

Conditions (10) are thus also necessary conditions for optimal transformation activities to occur.

The substitution of (10) into (9) yields:

$$(11a) \qquad 2a_2 - a_1 - g_e > 0,$$

$$(11b) \qquad 2d_2 - d_1 - g_e > 0.$$

Conditions (11) are an alternative statement of (10) as necessary conditions for optimal transformation activities. They require

essentially that there be risk premia in the term structures of interest rates for deposits and loans. The intuitive idea is that transformation positions can be optimal, when tier-matched positions are not, only if such risk premia exist in the yield curves.

Summary.

The empirical implications of the foregoing for the necessary yield spread conditions can be summarized as follows. The necessary conditions for optimal tier-matched portfolios are that $M_i > 0$, $i=1,2$, with M_i defined in equation (7). If either one of these conditions holds, then tier-matched portfolios are used in unlimited amounts to generate infinite profits for the institution.

If tier-matched portfolio are not profitable, however, then transformation positions would be considered by the institution. The necessary conditions for optimal long transformation (short deposits D_1 to long loans A_2) are given by equations (9) (that the transformation activity be profitable) and (11) (that there be risk premia in the term structures of deposit and loan rates).

2.B Solutions With Capital Market Securities

The possible role for riskfee capital market (say Treasury) securities as an additional element in the institution's optimal portfolio is now developed. Two distinct functions of these securities are considered: to meet the demand for earning assets or liabilities, and to hedge interest rate exposure.

Consider first such securities as an adjunct to optimal

tier-matched portfolios. Treasury securities will be included as earning assets in tier-matched portfolios only if the yield on the Treasuries exceeds the yield available on loans. It is apparent, however, that in practice Treasury securities will yield less than loans. The key reason is that loan origination requires expertise whereas investment in Treasuries does not, and the market equilbrium would reflect this with lower Treasury rates. Treasury securities thus will not displace loans as earning assets in the portfolios of depository institutions. Treasury securities also will not be held by depository institutions with tier-matched portfolios as assets to satisfy hedging needs since there is no interest rate exposure.

The possible role for Treasury securities as liabilities is more complicated. Depository institutions can now carry out short sales of Treasury securities using borrowed securities and repurchase agreements, but high fees make it unlikely that the cost of such funding would be competitive with deposits on an ongoing basis. The institutions, however, can also issue liabilities directly in markets that trade instruments closely related to Treasury instruments, and they appear to do so at least over certain maturity ranges. Net sales of Federal Funds by commercial banks represent the most important case, but commercial paper and preferred stock issues by bank and thrift holding companies, and advance borrowings by thrift institution members of the Federal Home Loan Banks perform a similar function for longer-dated instruments. The rates on these alternative instruments move with Treasury rates and are at levels only slightly above Treasuries.

The role of Treasury securities as earning assets or liabilities in transformation portfolios is essentially the same as in tier-matched portfolios. That is, loans dominate Treasuries as earning assets, but Treasury related instruments may dominate deposits as liabilities over some maturity ranges. More importantly, Treasury security holdings can function to reduce the interest rate exposure of transformed portfolios, unlike the case of tier-matched positions.

Consider an institution that issues the amount D_1 of short-term deposits, and invests in an equal amount A_2 of long-term loans, with expected profits and the variance of profits derived from equations (4):

$$(12) \qquad E[P] = (2a_2 - d_1 - g_e - c)D_1;$$

$$(13) \qquad V[P] = g_s(D_1)^2 .$$

The variance in profits will be reduced to zero if the institution purchases short-term securities $S_1 > 0$ and issues long-term security liabilities $S_2 < 0$, both in amounts equal in absolute value to D_1. Expected profits $E^*[P]$ are then:

$$(14) \qquad E^*[P] = (2a_2 - d_1 + s_1 - 2s_2 - c)D_1,$$

and the change in expected profits is:

$$(15) \qquad E^*[p]-E[P] = s_1 + g_e - 2s_2.$$

This change in expected profits, which measures the expected cost of carrying out the hedge, is exactly the negative of the risk premium in the Treasury term structure.

The institution will clearly use this hedging technique when the Treasury risk premium is zero, since the institution can then eliminate its interest rate exposure at zero cost. It appears generally, however, the Treasury yield curve has a risk premium, and the amount of hedging will decline as this risk premium rises. Indeed, there is an upper limit to the size of the risk premium, above which the institution will choose not to hedge at all. This upper limit is equal in size to the smaller of the risk premia in the loan and deposit yield curves. The risk premia in the loan and deposit markets determine the profit margin of the institution, and if the cost of hedging equals this amount the institution's profits have been eliminated (along with its risk).

This analysis of the hedging use of security positions applies to both cash market hedges, in which the cash markets for securities are used directly, and to futures market hedges, in which the organized futures markets are used. The commonality of the two hedging techniques arises because the pricing of futures contracts is based directly on the forward rates in the cash market term structure of Treasury yields. There is thus no difference in principle between taking a short futures market position in a one period ahead contract, and issuing a two-period Treasury instrument as a liability while simultaneously purchasing a one-period Treasury instrument as an asset in the cash markets.

As an empirical matter, it appears a fact (see Veit and Reif [1983]) that neither commercial banks nor thrift institutions have made significant use of futures markets to hedge their

interest rate exposure. This is understandable with regard to commercial banks since it appears they generally maintain tier-matched portfolios and thus have no need to hedge interest rate exposure. It is more complicated with regard to thrift institutions, since the large magnitude of their interest rate exposure in unambiguous. The limited use of futures contracts by thrifts can be explained, however, if the risk premium in the Treasury yield curve equals or exceeds the risk premium in either the loan or deposit yield curves.

3. AN EMPIRICAL BASIS FOR TIER MATCHING VERSUS TRANSFORMATION

Empirical data are presented in this section to evaluate the proposition that commercial bank operating margins significantly exceed those of thrift institutions, and that this is consistent with the use of tier-matched strategies by the banks versus the use of transformation strategies by the thrifts. It is worth noting at the outset that the data come primarily from regulatory reports, and while this leads to at least superficial uniformity, the structure of these reports is far from perfect for present purposes. Perhaps most importantly, there is little attempt to report various costs and revenues by functional activities. [9] The data cover the cost of deposits, operating expenses, and the return on loans for the two classes of institutions.

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9. The basic problem appears to be that depository institutions, at least in the U.S., carry out very little functional cost and revenue allocation. For example, the Federal Reserve System has a widely used, but voluntary survey and analysis of functional cost data for member institutions. From a universe of over 14,000 commercial banks, however, only 608 participated in the most recent 1983 survey (Federal Reserve System [1983]).

3.A The Cost of Deposits

Table 4 shows data on the effective interest cost of deposits at Savings and Loan Associations (S&Ls), the major thrift institution group, and at commercial banks. The rates are calculated by dividing the total interest paid on deposits by deposits outstanding for each group. The data are presented in five year intervals starting in 1965 and include 1983.

S&L deposit rates rose steadily over the period, reflecting both the trend in interest rate levels generally and the deregulation of ceilings on deposit rates starting in 1978. Commercial bank time deposit rates, which are comparable with S&L deposit rates, showed a stable pattern through 1975, with the commercial bank time deposit rates about 1/2 a percentage point below the S&L rates, reflecting customer preferences for commercial bank deposits. The data for 1980 and 1983 show a more erratic pattern.

The cost of total commercial bank deposits, not just time deposits, is relevant for analyzing profit margins. Total bank deposits include demand deposits on which little or no explicit interest is paid. The effective rate on total commercial bank deposits, including the low or zero cost of demand deposits, is much below the S&L cost. The commercial bank benefit from demand deposits has been shrinking to be sure, as shown by the declining percentage of total deposits that are demand deposits, but the low interest cost of demand deposits becomes more valuable when nominal interest rates are high. As of 1983 the cost of S&L deposits exceeded the cost of total commercial bank deposits by over 3 percentage points.

Table 4

Effective Cost of Deposits, Annual Percentage

	1965	1970	1975	1980	1983
1. Savings and Loan Associations	4.25	5.14	6.21	8.78	9.71
Commercial Banks					
2. Time Deposits	3.73	4.48	5.74	9.38	8.29
3. Total Deposits	1.59	2.18	3.37	6.64	6.54
4. (1) - (3)	2.66	2.96	2.84	2.14	3.17
Memo: Demand Deposits /Total Deposits	57	51	41	29	21

Sources:

Saving and Loan Associations: Office of Policy and Economic Research, Federal Home Loan Bank Board.

Commercial Banks: Bank Operating Statistics, 1970 to 1983, Federal Deposit Insurance Corporation. Federal Reserve Bulletin, June 1966 for 1965 data, Board of Governors of the Federal Reserve System. Data through 1975 exclude foreign deposits in foreign branch offices. Since these deposits are predominantly time deposits, demand deposits as a percentage of total deposits are overstated in the data shown for 1965, 1970, and 1975. The 1975 value would have been about 33 percent on the new basis.

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3.B Operating Costs

The difference between commercial bank and thrift costs of deposits shown in line 4 of Table 4 will overstate the actual commercial bank advantage because demand deposit accounts are more costly to maintain, including the costs of services in kind. Table 5 provides data from the Federal Reserve System's Functional Cost Analysis concerning the functional costs of maintaining demand versus time deposits (see also footnote 9). The allocated costs of maintaining demand deposit accounts have risen from 1.87% to 3.26% of demand deposits outstanding, while the allocated costs of maintaining time deposits have risen from .57% to about .96% of time deposits outstanding.

Thus in 1983 the costs of demand deposits exceeds the costs of demand deposits by 2.3% of the respective deposits outstanding. If this excess cost is averaged over the total deposit base, given that demand deposits represented 21% of total deposits in 1983, the cost of total deposits rises by .48% (= 2.3% x .21), that is about 1/2 of a percentage point. While this amount is not negligible, commercial banks still maintained a major advantage in total deposit costs.

Commercial bank costs may exceed thrift costs in areas other than direct demand deposit costs, reflecting the greater service levels generally provided by commercial banks. The broadest measure, which includes direct demand deposit costs as one component, is total non-interest operating expenses. The data in Table 6 compare the total operating expenses of S&Ls with those of commercial banks, stated as a percentage of their respective total deposits. This operating cost ratio has shown a strong and

Table 5

Non-Interest Operating Costs of Demand and Time Deposits

As A Percentage of the Respective Deposits Outstanding

	1970	1975	1980	1983
Demand Deposits	1.87	2.32	3.03	3.26
Time Deposits	.57	.57	1.01	.96

Source: Functional Cost Analysis, Federal Reserve System. Data are for the commercial bank sample with deposits in excess of $200 million.

Table 6

Non-Interest Operating Costs

As a Percentage of Total Deposits

	1965	1970	1975	1980	1983
1. Savings and Loan Associations	1.30	1.42	1.53	1.67	2.08
2. Commercial Banks	2.27	2.78	2.79	3.15	3.63
3. (2) - (1)	.97	1.36	1.26	1.48	1.55

Sources:

Savings and Loan Associations: 1984 Savings Institutions Sourcebook, United States Leageue of Savings Institutions.

Commercial Banks: Bank Operating Statistics, 1970 to 1983, Federal Deposit Insurance Corporation. Federal Reserve Bulletin, June 1966 for 1965 data, Board of Governors of the Federal Reserve System.

almost identical growth rate for both groups of institutions since 1965.

By 1983 the commercial bank cost ratio to total deposits exceeded the S&L ratio by 1.55 percentage points. As indicated above, about .5 percentage points of this amount can be attributed to direct demand deposit costs, leaving about 1 percentage point of costs to reflect other special bank services. The 1.55 percentage points of excess bank operating costs offsets about one-half of their 3.17 percentage point advantage in total deposit interest expense, but still leaves 1.62 percentage points as a net commercial bank advantage in operating margins.

3.C Rate of Return on Loans.

The rate of return earned on loans is the last component to be considered in comparing commercial bank and thrift operations. For this purpose, mortgage loans and commercial business loans are considered the primary loan instruments of the thrift and commercial banks respectively. These instruments are now compared in terms of the gross returns available on them after loan default losses. It can be noted that evidence from the Federal Reserve System's Functional Cost Analysis indicates that the expense of originating commercial loans may exceed the expense of originating mortgage loans by as much as 1% of the loan volume. This extra cost of commercial loans is already included, however, in the bank operating expenses just considered in 3.B.

Table 7 shows annual average values between 1970 and 1984 for a variety of interest rate series than can be used in

Table 7

Average Annual Interest Rates

Year	[1] Prime Rate	[2] Mortgage Rate	[3] [2]-[1]	[4] 1 Year Treasury	[5] 10 Year Treasury	[6] [5]-[4]
1970	7.91	8.45	.54	6.48	7.35	.87
1971	5.72	7.74	2.02	4.67	6.16	1.49
1972	5.25	7.60	2.35	4.77	6.21	1.44
1973	8.03	7.96	-.07	7.01	6.84	-.17
1974	10.81	8.92	-1.89	7.70	7.56	-.14
1975	7.86	9.00	1.14	6.28	7.99	1.71
1976	6.84	9.00	2.16	5.52	7.61	2.09
1977	6.83	9.02	2.19	5.71	7.42	1.71
1978	9.06	9.56	.50	7.74	8.41	.67
1979	12.67	10.78	-1.89	9.75	9.44	-.31
1980	15.27	12.66	-2.61	10.89	11.46	.57
1981	18.87	14.70	-4.17	13.14	13.91	.77
1982	14,86	15.14	.28	11.07	13.00	1.93
1983	10.79	13.12	2.33	8.73	11.10	2.37
1984	12.04	13.42	1.38	9.76	12.44	2.68
Aver-age	10.19	10.47	.28	7.95	9.13	1.18

Sources: [1], [4], and [5]: Federal Reserve Bulletin and Annual Statistical Digest, Board of Governors of the Federal Reserve System. [2]: Office of Policy and Economic Research, Federal Home Loan Bank Board (FHLBB). The FHLBB mortgage rate series includes 37% adjustable rate mortgages in 1983 and approximately 60% adjustable rate mortgages in 1984. Using estimates of the author, .55 percentage points in 1983 and 1.05 percentage points in 1984 are included in the tabulated data to maintain consistency with the fixed-rate data of earlier years. This assumes a spread between fixed-rates and variable-rates of 1.5 percentage points in 1983 and 1.75 percentage points in 1984.

comparing commercial loan rates with mortgage rates. Column [1] shows the commercial loan Prime Rate. By using the prime rate for this purpose, the commercial loans can be considered essentially riskfree. It is likely that commercial loan rates on loans above prime amply compensate banks for the actuarial costs of default, so that the prime rate is if anything too low as an estimate of the risk adjusted yield on all commercial loans.

Column [2] shows the average effective mortgage loan rate for fixed-rate contracts. There is risk of delinquency (payments in arrears) and foreclosure (default) on such loans. Delinquency rates have approached 1 percent of loans at times. Actual foreclosure, however, is rare, with current rates under .05 percent, so the actuarial risk adjustment appears negligible. The maturity aspect of fixed-rate mortgages is a more serious matter, since the stated maturity of these mortgages is typically in excess of 20 years, and even the effective maturity (taking into account that the contracts become due when the property is sold) is on the order of ten years. The analysis that follows focuses on this matter.

Column [3] of Table 7 shows the difference between the mortgage rate of column [2] and the commercial loan rate of column [1]. The average difference is a relatively small .28 percent for the 15 year sample. Ascending yield curves have been more common than descending yield curves over this period, moreover, so that after correction for their longer-term maturity, it would appear that mortgage rates were below commercial loan rates. As one measure of this yield curve

adjustment, the data in column [6] shows the spread between 10-year Treasury rates (column [5]) and 1-year Treasury rates (column [4]). The Treasury yield spread averages 1.18 percentage points over the 15 year sample, which is substantially larger than the mortgage rate/commercial loan rate difference. Indeed, taken at face value, this indicates that after adjustment for maturity differences, mortgage rates are almost 1 percentage point less than commercial loan rates.

An alternative basis for this maturity adjustment is available with new data on adjustable rate mortgages (ARMs). ARMs have recently represented the majority of mortgage originations. During 1984 ARMs were frequently priced at 2 percentage points above the 1-year Treasury bill rate. Using this formula, ARMs rates during 1984 would have average 11.76%, about .25 % below the average prime rate. Similarly, over the full 15 year sample, ARMs rates would have averaged 9.95%, again about .25 % below the sample average for the prime rate.

3.D Summary.

The evidence surveyed here indicates that commercial bank profit margins exceed thrift institution margins by a substantial amount, probably in excess of 1.5% . The key commercial bank advantage lies in their demand deposit accounts, which provided a total cost of deposit funds more than 3% below the thrift institution cost of funds in 1984. This advantage is offset in part by higher non-interest operating expenses for commercial banks; bank operating costs exceeded comparable thrift costs by 1.55 % of their respective total deposits in 1984. Nevertheless,

a profit margin advantage of about 1.5 percentage points remains for the banks. Finally, a comparison of the gross returns on commercial loans for the banks versus mortgages for the thrifts suggests, after correction for maturity differences, that bank loan returns exceed thrift loan returns by at least .25 percentage points and possibly more.

4. THRIFT MANAGEMENT AND REGULATORY RESPONSE

Profit margins for thrift institutions following tier-matched strategies are too low to be attractive, especially given the negative net worth (at market prices) of most of these institutions. On the deposit side, thrift institutions face competition from Money Market Mutual Funds and commercial banks, and essentially must pay money market rates for their funds. On the mortgage loan side, homeowners require significant rate concessions to borrow with adjustable rate mortgages, and mortgage banking competitors have become increasingly aggresive. The resulting operating margins are just too low to cover operating expenses and to provide a significant profit.

There are several alternative strategies. Term structure intermediation, with the institutions borrowing short and lending long, remains appealing given the large and continuing risk premia in the term structure. Regulators understandably dislike such policies, since the Deposit Insurance reserves bear essentially all of the risk, given the industry's limited net worth. But, on the other side, regulators should then not be surprised to see loan quality deteriorate as the institutions attempt to boost the profit margins from tier-matched portfolios.

A second strategy is for the institutions to enter new business lines. Mortgage banking, in which large volumes of mortgages are originated and sold to final investors with fees earned in the process, has been a frequent and successful choice. Mortgage banking may be successful because it makes use of the existing expertise in mortgage lending and the institution's portfolio for "warehousing" mortgages awaiting sale. While mortgage banking is a risky undertaking, the activities can be placed in a subsidiary of a holding company, thus protecting the thrift institution and thereby the insurance Fund from the risk. Regulators should be warned, however, that this strategy is reminiscent of banking in the U.S. before the separation of commercial banking from investment banking.

Cost reduction is a third strategy that has been pursued by a small number of institutions, but may be worthy of more general consideration. Average thrift operating costs were about 2% of total deposits in 1983, but there are at least some institutions operating with costs 3/4 to 1 percentage point below this level. The cost savings are achieved primarily by delivering deposit services with lower office occupancy and teller expenses, while the diminished service level is offset by paying slightly above market rates for deposits. Such institutions can compete with Money Market Funds on their own terms while providing a distinct alternative to high service banks.

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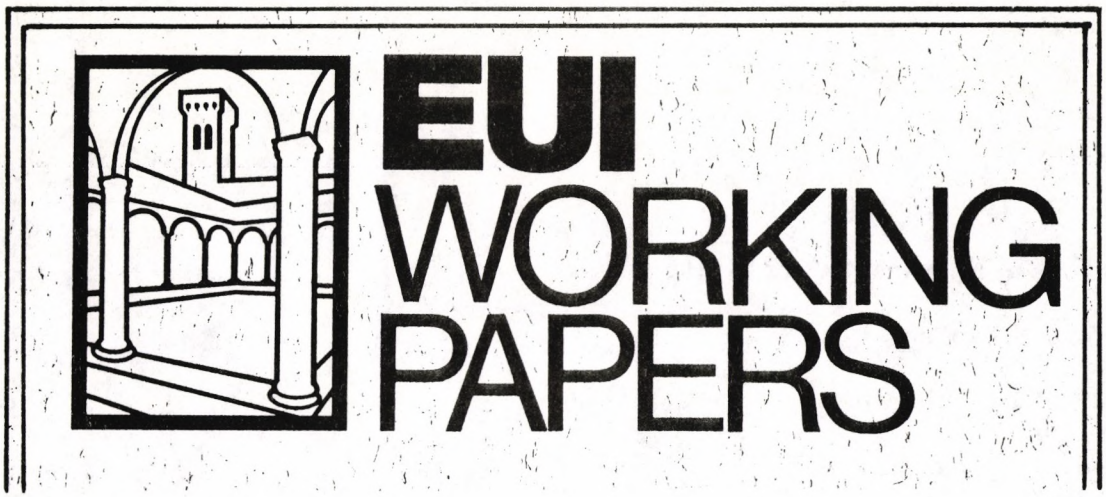

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